

Comparison of Spatial Skills of Students Entering Different Engineering Majors

N. Veurink

*Engineering Fundamentals
Michigan Technological University*

S. A. Sorby

*Engineering Education Innovation Center
The Ohio State University*

Summary

Spatial skills have been shown to be important to success in an engineering curriculum, and some question if poor spatial skills prevent students from entering STEM fields or if students with weak spatial skills avoid engineering disciplines believed to be highly spatially-oriented. This study builds on a 2011 Veurink and Hamlin study by comparing Purdue Spatial Visualization: Rotations (PSVT:R) test scores by engineering major of Michigan Tech freshmen engineering students who matriculated between 1996 and 2009. Parolini (1994) showed there is a link between math ACT and PSVT:R scores, so Math ACT scores were also included in the current study.

This study found that freshmen engineering students in Environmental and Geological Engineering have the lowest average PSVT:R scores, while students in Electrical, Computer, and Mechanical Engineering have the highest average scores. Although the Environmental Engineering students have the lowest average PSVT:R score, they do not have the lowest average Math ACT score, nor do the Mechanical Engineering students, who have the highest average PSVT:R score, have the highest average Math ACT score.

Since some of the engineering disciplines have a higher percentage of females than others and studies have shown that females often have less-developed spatial skills compared to males, PSVT:R and Math ACT scores for students in the different engineering majors were compared by gender. Mechanical and civil engineering are typically considered to be highly visual engineering fields, and the study found that both males and females in Mechanical Engineering have the second highest average PSVT:R score in their gender group, females in Civil Engineering have the highest spatial test average of all the females, and males in Civil Engineering have the fourth lowest PSVT:R average of the males. Females in Electrical, Computer, and Environmental Engineering (fields which may be perceived as less visually demanding) have lower PSVT:R scores than females in most other disciplines. Male Environmental Engineering students have the second lowest PSVT:R scores of the males. In general, for both males and females, the students in engineering majors with lower PSVT:R scores also had lower Math ACT scores, although exceptions did occur.

It should be noted that the scores reported here are for first-year engineering students who completed the test before enrolling in any college courses. They are not really “mechanical engineers” per se, since they graduated from high school only three months prior to taking the test. So, in reality, this study attempts to measure whether students with high spatial ability are *attracted* to fields where high spatial ability is a requirement. From this study, it appears that for women, well-developed

spatial skills are particularly important in order to be attracted to fields which are perceived to be highly spatial (civil and mechanical); whereas, for men, this does not seem to be as critical.